

ENTRY NO. C34 Date .. June, 1992

Name of Machine INS. SF. Cyclotron

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HISTORY

MILESTONE DATES:
 Design 1968 Model Tests 1968-1970

Construction 1969-1973 First Beam 1974

DESIGN/CONSTRUCTION BY:
 in house yes other constructed by Mitsubishi

COST: Accelerator 3×10^8 yen Facility 7×10^8 yen

FUNDED BY: Japan Ministry of Education

STATUS

STAFF: Machine
 Scientists 1 Engineers 3

Technicians 3 Students 0

Research (in house/external)
 Scientists 10 / 30 Engineers 5 /

Technicians 10 /

BUDGET: Machine 3×10^7 yen Funded by JME

Research 5×10^7 yen Funded by JME

TIME DISTRIBUTION:
 Basic Research (in house/external) 50 % / %

Applied Program (in house/external) % / 5 %

Development 5 % Maintenance 20 %

MAGNET

POLE PARAMETERS:
 Diameter 168 cm $R_{extract}$ 73 cm R_{inject} cm

HILL PARAMETERS: Gap (min) 14.6 cm B_{max} T

(Θ AT) Gap (max) 14.6 cm B_{min} T

VALLEY PARAMETERS: Gap (min) 22.8 cm B_{max} T

(Θ AT) Gap (max) 22.8 cm B_{min} T

AVERAGE FIELD: $\langle B \rangle_{min}$ T $\langle B \rangle_{max}$ 1.64 T

NUMBER OF SECTORS: compact/separated 3 /

sector angle deg. spiral (max) 55 deg.

FIELD TRIMMING: Trim Coils 11

Harmonic Coils 7

Other

CURRENT: Main Coils 600 Amps Stability 10^{-5}

Trim Coils 450, 250 Amps Stability 5×10^{-4} , 10^{-3}

Stored Energy (cryogenic) MJ

WEIGHT: Iron 130 tons Conductor 5 tons

ION ENERGY: Bending Limit $E/A = \dots 68 \dots q^2/A^2$ MeV/u

Focussing Limit $E/A = \dots 48 \dots q/A$ MeV/u

ACCELERATION SYSTEM

FUNDAMENTAL ACCELERATION:
 Description: lambda/4 resonator, MOPA

No. of Gaps/turn 2 $dE/dn(max)$ 0.14 MeV/q

Voltage(max) 0.07 MV Harmonic f_{rf}/f_{ion} 1, 3, 5

Freq 7.4-22.5 MHz Power in(max) 0.15 MW

Stability: Phase ± 1.0 deg. Voltage 2×10^{-4}

OTHER CAVITIES (Flattopping or otherwise):
 Description:

Region of Influence: R_{min} cm R_{max} cm

No. of Gaps/turn $dE/dn(max)$ MeV/q

Voltage(max) MV Harmonic f_{rf}/f_{ion}

Freq MHz Power in(max) MW

Stability: Phase Voltage

VACUUM SYSTEM

OPERATING PRESSURE: 2×10^{-6} Torr

PUMPS: No. and type 36 inch and 10 inch oil diffusion

ION SOURCE(S)

| Type | Intensity (mA) | Θ | $\epsilon_n = \beta\gamma\epsilon$ (mm mrad) | Ion Species |
|----------------------|----------------|-----------|--|-------------------------|
| (a) .. internal.PIG | | | | $p, d, ^3He, \alpha$.. |
| (b) cold cathode.PIG | | | | |
| (c) .. ECR | 0.08 | Ar^{8+} | | Li, Ar |
| (d) | | | | |

INJECTION SYSTEM

axial inj.(electrostatic mirror)..... Efficiency ... 15... %

EXTRACTION SYSTEM

2.channel dc deflectors Efficiency ... ~90... %

CHARACTERISTIC BEAMS

| Accelerated Ions | E/A (MeV/u) | Current(part μA) | |
|---------------------|-------------|------------------------|----------|
| | | Internal | External |
| (a) .. p | 45 | | 10 |
| (b) .. α | 17 | | 5 |
| (c) .. $^6Li, ^7Li$ | 6.7 | | 1, 1 |
| (d) .. $^4He, ^3He$ | 6.2 | | 0.6 |

| Secondary Particles | E (MeV) | part/sec |
|---------------------|---------|----------|
| (a) | | |
| (b) | | |
| (c) | | |

EXTRACTED BEAM PROPERTIES:

For 0.1 μA of 12.5 MeV/u α ions

$\Delta E/E$ 0.1 % $\Delta \phi$ 30 $^\circ$ rf

$\epsilon_n = \beta\gamma\epsilon$ x 18 π mm mrad z 13 π mm mrad

FACILITIES FOR RESEARCH

SHIELDED AREA: Fixed 950 m^2 Moveable m^2

Target Stations: 11 No. Served At Same Time: 1

MAGNETIC SPECTROMETERS: QDP

OTHER FACILITIES: 80 cm scatt.chamber

IGISOL, GARIS, line for channeling

HI cooler ring TARN II

REFERENCES/NOTES

- (a) .. proc. 7th Cyclotron conf., p. 103 and 312 (1975)
- (b) .. proc. 7th Cyclotron conf., p. 1984 (1978)

PLAN VIEW OF FACILITY, COMMENTS

